Proceedings of the Iowa Academy of Science

Volume 31 | Annual Issue Article 72

1924

Chemical Engineering and Agriculture

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graphite in the first case and amorphous carbon in the second. This is in fair agreement with a calorimetric determination made by Ruff.

CHEMICAL ENGINEERING AND AGRICULTURE

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Chemical engineering is finding extensive application in two important phases of agriculture, the preparation of fertilizers to enrich the soil and the better utilization of waste agricultural products. The second phase has been studied at Iowa State College, particularly in regard to corncobs and oathulls. They contain pentosans, which can be converted to furfural, a potentially valuable product. Cobs may be destructively distilled to yield useful products including a char which can be highly activated. Cobs or oathulls may be treated with a phenol to form a black resin which can be manipulated into a valuable insulating and decorative material.

SOLUBILITY IN AUSTENITE OF CARBON FROM CARBON AND OF CARBON FROM IRON-CARBIDE

H. L. MAXWELL AND ANSON HAYES

For the well established equilibria:

$$
\begin{array}{ll}
(1) & Fe_3C + CO_2 \rightleftarrows 3Fe + 2CO + \Delta H_1 \\
(2) & C + CO_2 \rightleftarrows 2CO + \Delta H_2 \\
(3) & [C]_1 + CO_2 \rightleftarrows 2CO \\
(4) & [C]_2 + CO_2 \rightleftarrows 2CO \\
(5) & [C] + CO_2 \rightleftarrows 2CO
\end{array}
$$

Where $[C]$= concentration of dissolved carbon in austenite, $[C]_1$= saturated value of carbon from carbon, $[C]_2$= saturated value of carbon from iron carbide, and K_1, K_2 K_3 . . . . .are the gaseous equilibrium constants for these reactions. Thermodynamics demands $K_2 = K_4$, $K_2 = K_3$ and that K_5 is a function of the concentration of carbon in austenite. Since iron-carbon alloys graphitize down to some 0.9% combined carbon or less, Fe_3C is metastable with respect to carbon from 720° to 1130°C. Since the heat of formation of Fe_3C is -15100 calories, it follows from the equation

$$(d/dT)\ (Log\ K) = \Delta H/RT^2$$

and from the metastability of Fe_3C that the carbon solubility line of the iron-carbon diagram lies to the left of the cementite solubility line and has a greater slope.